PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Concepts of Science 9

Curriculum writing committee:

James Albert

Grade Level:

9

Date of Board Approval: ____2020_____

Science Department Grading Policy

Category	Major Assessments	Skills Application	Skills Practice	Participation
Weight %	**45%**	**30%**	**20%**	**5%**
Examples	Common Assessment/ Unit Test	chapter test- MC for recall	summary writing process- introduction/body/conclusion	research paper check for completion
	Research Paper	article summary- page +	rough draft for content	outlining a chapter- T chart/completing vocab
	Persuasive essay- or any formal writing assignment that requires more than 1 citation	lab questions with collection of data and graphing of data	vocab quiz	warmups/exit slips
			short answer homework	parent signatures of grade reports
	Chapter test- short answer/essay (can include MC)	Constructed Responses- can be homework or in class		
			assessing their reading comprehension- quiz	homework graded for completion
	formal lab report	Presentation graded on depth of knowledge	developing a powerpoint/brochure	participation
	lab application exam		study workbook evaluation	class preparation
	assessing real world problems or applying knowledge in real world context	Writing assignment for a video	graphing of data	pre-assessments
		Short answer quiz	practice problems	behavior

Each assignment within a category can be further weighted by use of a point system. Some assigments will be worth more points and some less.

Curriculum Map

Overview:

This course provides students an understanding of ecology and environmental study. The course will delve into aspects of ecological study including organism adaptations, population dynamics, trophic structure, community interactions and ecosystem connections, culminating in application of these features to terrestrial and aquatic biomes. The course will also provide a focus on human population growth, demographic study and its connection to a variety of environmental topics including, but not limited, to land use, soil, energy and resource management, mining, water pollution, conservation and global warming. This course will begin to prepare students for the Keystone Biology Exam, stressing writing and data analysis utilizing current events to develop necessary critical thinking skills in a rapidly evolving society.

FULL YEAR, 1 CREDIT, GRADE 9

Goals:

Understanding of:

Marking Period 1:

- Science and the Scientific Method
- Earth's Spheres, Systems, and Cycles
- Population Ecology

Marking Period 2:

- Population Ecology
- Community Ecology
- Energy in Ecosystems

Marking Period 3:

- Energy in Ecosystems
- Terrestrial Biomes and Ecosystems
- Aquatic Ecosystems
- Characteristics of Living Things, Biodiversity, and Biological Classification

Marking Period 4:

- Natural Resource Management: Fisheries and Forestry
- Natural Resource Management: Agriculture and Food production
- Natural Resource Management: Mining and Mineral Resources
- Natural Resource Management: Water
- Natural Resource Management: Renewable and Non-Renewable Energy
- Environmental Issues Final Project

Big Ideas:

- Environmental science is built upon multiple other fields of science
- Living things depend on their habitat to meet their basic needs.
- The survival of living things is dependent upon their adaptations and ability to respond to natural changes and human influences on the environment.
- Aquatic, terrestrial and human-made ecosystems consist of diverse living and nonliving components that change over time and among geographic areas.
- The survival of living things is dependent upon their adaptations and ability to respond to natural changes in and human influences on the environment.
- People acting individually and/or as groups influence the environment.
- Environmental laws and regulations influence humans, the environment, and the economy in both positive and negative ways.
- Sustainable use of natural resources is essential to provide for the needs and wants of all living things now and in the future.
- Humans depend upon the management and practices of agricultural systems.

Textbook and Supplemental Resources:

- Primary Text: Pearson Environmental Science, Pearson Education, 2011.
- Pearson Environmental Science Section Assessments
- Pearson Environmental Science Study Workbook Level A
- Pearson Environmental Science Chapter Assessments
- Pearson Environmental Science Examview Assessment Builder
- Pearson Environmental Science Electronic Resources Disc

Curriculum Plan

Unit 1: Science and the Scientific Method **Time/Days: 20 days**

BY unit list:

Standards: 3.2.10.B.7, 3.3.10.A.8, 3.1.12.A8, 4.3.12.C, 3.5.7.B, 3.1.12.B, 3.1.12.C, 3.4.10.B1., 3.4.10.D3., CC.3.5.9-10.C, CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B7, 3.3.10.A8, 3.1.10.A9, 3.1.B.A9

Anchors: S11.A.3.2 S11.A.1.1.1, S11.A.1.1.2, S11.A.1.1.3, S11.A.1.1.5, S11.A.1.2.2, S11.A.1.3.1, S11.A.1.3.3, S11.A.1.3.4, S11.A.2.1.1, S11.A.2.1.2, S11.A.2.1.3, S11.A.2.1.4, S11.A.2.1.5, S11.A.2.2.1, S11.A.3.1.2, S11.A.3.2.2, BIO.A.2.2

Eligible Content: Classify observations as qualitative and/or quantitative; Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation; Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practice; Explain how certain questions can be answered through scientific inquiry and/or technological design; Use evidence, such as observations or experimental results, to support inferences about a relationship; Develop descriptions, explanations, predictions, and models using evidence; Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations); Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes; Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems; Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.

Objectives:

- Define the environment (DOK 1)
- Distinguish between the natural and supernatural world (DOK 2)
- Define environmental science (DOK 1)
- Identify problems that environmental science can address (DOK 1)
- List the contributing branches of science that make environmental science an interdisciplinary field (DOK 1)
- Identify bias (DOK 1)
- Argue why bias does not belong in scientific thinking (DOK 3)
- Define natural resources (DOK 1)
- Categorize resources as renewable or nonrenewable (DOK 2)
- Describe the trend in human population growth, identifying key events (agricultural and industrial revolution, etc.) (DOK 1)
- Calculate ecological footprints (DOK 2)
- Compare/contrast science as both a body of knowledge and a process (DOK 2)
- Argue the importance of evidence in supporting scientific fact (DOK 3)
- Distinguish between evidence/opinions and objective/subjective ideas (DOK 2)

- Make and differentiate between observations and inferences (DOK 3)
- Identify the steps of the scientific method (DOK 1)
- Generate a hypothesis (DOK 2)
- Compare/contrast independent and dependent variables (DOK 2)
- Identify the independent and dependent variables in an experiment (DOK2)
- Predict outcomes of a scientific experiment (DOK 2)
- Differentiate the difference between hypotheses, theory, and scientific laws (DOK 3)
- Define environmental ethics (DOK 1)
- Distinguish between anthropocentric, biocentric, ecocentric, and other worldviews (DOK 2)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- "What is Science/Environmental Science" Drawing Activity – Students will draw illustrations of 10 terms/concepts they remember about science from previous years, teacher will guide and assist students as they work on the activity
- Tragedy of the Commons Fishing Activity – Students to be divided into learning groups, teacher will lead the groups through the steps of the project
- Observation/Inference Outdoor Drawing Activity (conditions permitting) – Teacher will explain the differences between observations and inferences (using examples), practice examples to be provided to the class and/or pairs, teacher will direct students to outdoor location and supervise students completing the activity
- Mineral Density Lab – teacher demonstration of how to carry out procedures and measurements before having student pairs/groups perform the lab tasks, teacher to guide student groups through the process of the lab activity – from material collection to clean-up
- Chapter 1 Central Case: Fixing a Hole in the Sky – Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

Assessments:

- **Diagnostic:** "What is Science/Environmental Science" drawing activity, and ATBs
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit One Common Assessment – modified multiple choice (3 choices)

Unit 2: Earth's Spheres, Systems, and Cycles **Time/Days: 20 days**

BY unit list:

Standards: 3.1.B.A2, 3.1.B.A7, 3.1.C.A9, 3.1.B.B1,BIO.A.2.1, BIO.A.2.2, CC.3.5.11-12.B, CC.3.5.9-10.E, CC.3.6.11-12.C, 3.3.10.A1, 3.3.10.A2, 3.2.C.B7, 3.3.10.A3,3.3.10.A4, 3.3.10.A5, 3.3.10.A6, 3.3.10.A7, 3.3.10.A8, 3.3.12.A1, 3.3.12.A5, 3.3.10.A4, 3.3.10.A5, 3.1.10.A7, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.B.A7, 3.1.B.A8, 3.1.B.A9, 3.2.10.A2

Anchors: BIO.A.2.2, BIO.A.3.2, BIO.B.4.2, BIO.B.1, BIO.A.2.1, BIO.B.1.2, BIO.B.3.3

Eligible Content: Describe how biological macromolecules form from monomers. Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Know that both direct and indirect observations are used by scientists to study the natural world and universe. Recognize and analyze alternative explanations and models. Describe the unique properties of water and how these properties support life on Earth (e.g., freezing point, high specific heat, cohesion). Identify the initial reactants, final products, and general purposes of photosynthesis and cellular respiration. Analyze the importance of carbon to the structure of biological macromolecules. Compare and contrast the functions and structures of proteins, lipids, carbohydrates, and nucleic acids. Describe how the unique properties of water support life.

Objectives:

- Describe Matter (DOK 1)
- Distinguish between an element and an atom (DOK 2)
- Identify the three subatomic particles (DOK 1)
- Compare and contrast ionic and covalent bonding (DOK 2)
- Define molecules and compounds and provide examples of each (DOK 1)
- Compare/contrast organic and inorganic molecules (DOK 2)
- Define a hydrocarbon (DOK 1)
- Show how polymers are created from monomers (DOK 2)
- Describe the four macromolecules of life. (DOK 3)
- Identify the properties of water. (DOK 1)
- Define a solution as an acid, base, or neutral based on position on the pH scale (DOK 2)
- Compare/contrast positive and negative feedback loops (DOK 2)
- Define Earth's geosphere, lithosphere, biosphere, atmosphere, and hydrosphere. (DOK 1)
- Explain the parts of Earth's atmosphere. (DOK 3)
- Distinguish and explain the processes of the water and carbon cycles. (DOK level 2)
- Compare and contrast the net equations for photosynthesis/cellular respiration (DOK 1)
- Define consumers and producers (DOK 1)
- Describe the roles of consumers and producers in biogeochemical cycles (DOK 2)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Chapter 3 Central Case: The Gulf of Mexico's Dead Zone - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen
- Nitrogen Cycle Activity – This activity should be implemented after completing the section on biogeochemical cycles, Teacher will divide the students into pairs/groups, teacher to guide the pairs/groups through the activity to keep smooth movement between the stations

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 2 Common Assessment - modified multiple choice (3 choices)

Unit 3: Population Ecology **Time/Days: 20 days**

BY unit list:

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.1.10.A1,3.1.10.A2, 3.1.10.A9, 3.1.B.A1, 3.1.B.A2, 3.1.B.A9, 3.1.B.B6

Anchors: BIO.B.3.3, BIO.B.4.1, BIO.B.4.2

Eligible Content: Describe relationships between structure and function at biological levels of organization. Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms). Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. Describe interactions and relationships in an ecosystem. Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe the effects of limiting factors on population dynamics and potential species extinction.

Objectives:

- Define ecology (DOK 1)
- List and describe the levels of biological organization from atom to biosphere (DOK 1)
- Identify which levels of organization are studied by ecologists (DOK 1)
- Differentiate among individuals, populations, communities, ecosystems, biomes, & the biosphere (DOK 2)
- Compare/contrast biotic and abiotic factors (DOK 2)
- Distinguish the difference between climate and weather (DOK 2)
- Explain how a species' habitat provides the resources it needs for survival (DOK 3)
- Define ecological tolerance (DOK 1)
- Define population size (DOK 1)
- Calculate population sizes using sampling and mark-recapture techniques (DOK 2)
- Define population density. (DOK level 1)
- Investigate the three ways populations can be distributed. (DOK level 3)
- Explain the historical and future patterns age structure diagrams tell you about a population. (DOK level 3)
- Distinguish the differences between type 1, 2 and 3 survivorship curves
- Distinguish the factors that influence a population's growth rate (natality, mortality, immigration, emigration). (DOK 2)
- Distinguish the differences between seasonal migration, immigration, and emigration (DOK 2)
- Compare/contrast exponential and logistic growth. (DOK 2)
- Construct a graph labeling and explaining the phases of exponential and logistic growth (DOK 3)
- Define carrying capacity (DOK 1)

- Predict carrying capacity using a logistic growth curve (DOK 2)
- Define limiting factors (DOK 1)
- Define the two types of limiting factors (DOK 1)
- Describe how limiting factors (density dependent and density independent) and biotic potential affect population growth. (DOK 3)
- Show how limiting factors determine carrying capacity (DOK 2)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Chapter 4 Central Case: Finding Gold in a Costa Rican Cloud Forest - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen
- Sampling Simulation Lab – Teacher will provide materials and directions, explain the introduction and directions, arrange pairs/groups, and monitor/assist students as they complete the simulation
- Logistic Growth Curve Drawing Project – teacher to present past examples of student projects as examples, teacher to provide directions (contains list of terms and concepts – includes point values) to all students pairs/groups, teacher will need to monitor and assist groups as they follow through the directions of the project

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 3 Common Assessment - modified multiple choice (3 choices)

Unit 4: Community Ecology **Time/Days: 20 days**

BY unit list:

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B2, 3.2.C.B3, 3.3.10.A5, 3.1.10.A1, 3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.B.A9, 3.1.B.B6, 3.1.10.C1, 3.1.10.C2

Anchors: BIO.A.2.2, BIO.A.3.1, BIO.A.3.2, BIO.B.1.2, BIO.B.2.3, BIO.B.3.1,BIO.B.3.2, BIO.B.4.1, BIO.B.4.2, 3.1.B.C1

Eligible Content: Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. Describe interactions and relationships in an ecosystem. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction. Identify and describe the cell structures involved in processing energy. Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. Identify and describe how energy is captured and transformed in organisms to drive their life processes. Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. Explain how natural selection can impact allele frequencies of a population. Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration). Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

Objectives:

- Compare/contrast evolution and biological evolution (DOK 2)
- Define speciation. (DOK 1)
- Summarize how a species' adaptations determine an organism's niche in a habitat. (DOK 2)
- Define resource (DOK 1)
- Identify patterns in the relationship between a habitat and niche (DOK 2)
- Define niche and resource partitioning (DOK 1)
- Compare examples of niche and resource partitioning (DOK 2)
- Distinguish between competition and competitive exclusion (DOK 2)
- Describe the difference between intraspecific and interspecific competition (DOK 2)
- Identify patterns of how invasive species impact biodiversity, habitats, and native species (DOK 3)
- Compare the differences in ecological tolerance between generalists and specialists (DOK 2)
- Compare and contrast predation, parasitism, and herbivory. (DOK 2)
- Define mutualism and commensalism. (DOK 1)
- Distinguish examples of the different types of symbiotic relationships (DOK 2)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Predation or Starvation Graphing Activity- teacher will provide activity instructions and materials, discuss the introduction and directions, arrange pairs/groups, and assist students as they complete the activity
- Chapter 5 Central Case: Black and White and Spread All Over - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 4 Common Assessment – modified multiple choice (3 choices)

Unit 5: Energy in Ecosystems **Time/Days: 20 days**

BY unit list:

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B2, 3.2.C.B3, 3.3.10.A5, 3.1.10.A1, 3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.B.A9, 3.1.B.B6, 3.1.10.C1, 3.1.10.C2

Anchors: BIO.A.2.2, BIO.A.3.1, BIO.A.3.2, BIO.B.1.2, BIO.B.2.3, BIO.B.3.1,BIO.B.3.2, BIO.B.4.1, BIO.B.4.2, 3.1.B.C1

Eligible Content: Describe ecological levels of organization in the biosphere. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. Describe interactions and relationships in an ecosystem. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction. Identify and describe the cell structures involved in processing energy. Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. Identify and describe how energy is captured and transformed in organisms to drive their life processes. Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration. Explain how natural selection can impact allele frequencies of a population. Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration). Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

Objectives:

- Explain the difference between a producer and a consumer. (DOK level 3)
- Explain the difference between autotrophs and heterotrophs (DOK 3)
- Identify examples of producers and consumers (DOK 1)
- Name and define the different types of consumers (DOK 1)
- Distinguish the difference between photosynthesis and chemosynthesis (DOK 2)
- Summarize gas exchange and transpiration through plants (DOK 2)
- Compare the roles of phytoplankton and zooplankton as producers and consumers (DOK 2)
- Using examples, explain why producers are the foundation of all food chains – aquatic and terrestrial (DOK 4)
- Define the 10% rule (DOK 1)
- Show that food chains and food webs display trophic levels and direction of the flow of energy (DOK 2)

- Classify the trophic levels of food chains and food webs (DOK 2)
- Assess why apex predators (using a food web) are necessary for healthy communities (DOK 4)
- Define keystone species (DOK 1)
- Compare examples of plant and animals' species that are scientifically considered keystone species (DOK 3)
- Distinguish the difference between primary and secondary succession (DOK 2)
- Summarize the stages of succession from pioneer species to a climax community (DOK 2)
- Explain what happens to a community after a disturbance. (DOK 3)
- Explain the conditions necessary for a species to become invasive. (DOK 3)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Keystone Species Drawing Project: Teacher will arrange pairs/groups, provide students with directions, and monitor assist students with the project.

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 5 Common Assessment – modified multiple choice (3 choices)

Unit 6: Terrestrial Biomes/Ecosystems and Aquatic Ecosystems **Time/Days: 20 days**

BY unit list:

Standards: CC.3.5.9-10.E, CC.3.6.11-12.C, 3.1.10.A1,3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A9, 3.1.B.A2, 3.1.B.A5, 3.1.10.B1, 3.1.10.B6, 3.1.B.B1

Anchors: BIO.A.2.2, BIO.A.3.1, BIO.A.3.2, BIO.B.4.2

Eligible Content: Describe ecological levels of organization in the biosphere.
Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, biosphere). Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. Describe interactions and relationships in an ecosystem. Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction.

Objectives:

- Create a presentation that applies concepts of ecology to a biome and ecosystem. (DOK 4)
- Explain the conditions necessary for a species to become invasive. (DOK level 3)
- Explain the abiotic factors that determine how biomes are characterized. (DOK level 3)
- Distinguish between climate and weather (DOK 2)
- Describe three major climate zones (DOK 2)
- Analyze climate data from climatographs, to determine the types of biomes (DOK 3)
- Distinguish between gross primary production and net primary production (DOK 2)
- Explain how organisms are adapted to the conditions of their biomes (DOK level 3)
- Analyze the criteria (characteristics and zones), ecologists use to classify aquatic ecosystems. (DOK level 4)
- List the major categories of freshwater ecosystems. (DOK level 1)
- Describe the basic types of wetlands (DOK 2)
- Explain the ecological importance of estuaries. (DOK level 3)
- Analyze the criteria (characteristics and zones), ecologists use to classify marine ecosystems. (DOK level 4)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Chapter 6 Central Case: Too Much of a Good Thing? - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

- Climatograph Activity – Teacher will provide the instructions and materials, arrange the pairs/groups, assign which locations each pair/group will be responsible for analyzing the data, and monitor and assist students through the project
- Biome Presentation Project – Teacher will arrange pairs/groups, provide the instructions, discuss the project with the class, provide the grading rubric, and schedule the presentation dates for the project

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 6 Common Assessment – modified multiple choice (3 choices)

Unit 7: Taxonomy, Biodiversity, and Characteristics of Living Things Time/Days: 15 days

BY unit list:

Standards: CC.3.5.9-10.E, 3.1.10.A1,3.1.10.A2, 3.1.10.A3, 3.1.10.A5, 3.1.10.A6, 3.1.10.A7, 3.1.10.A9, 3.1.B.A1, 3.1.B.A2, 3.1.B.A3, 3.1.B.A5, 3.1.B.A7, 3.1.B.A8, 3.1.C.A1, 3.1.10.B1, 3.1.B.B6, 4.1.10.D

Anchors: BIO.A.1.1, BIO.A.1.2, BIO.A.2.2, BIO.A.2.3, BIO.A.3.1, BIO.A.3.2, BIO.A.4.2, BIO.B.1.2

Eligible Content: Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms. Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms). Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms. Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation). Explain how genetic information is inherited. Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere). Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). Describe the effects of limiting factors on population dynamics and potential species extinction.

Objectives:

- Distinguish between eukaryotes and prokaryotes (DOK 2)
- Define binomial nomenclature (DOK 1)
- Investigate how scientists systematically classify organisms (DOK 3)
- Summarize the characteristics of living things (DOK 2)
- Distinguish between the different macro(bio)molecules (DOK 2)
- Define nutrient (DOK 1)
- Distinguish the basic nutrients (DOK 2)

- Define homeostasis (DOK 1)
- Define metabolism (DOK 2)
- Define system (DOK 1)
- Distinguish between genetic, species, and ecosystem diversity (DOK 2)
- Describe a species as a reproductively distinct group of organisms. (DOK 1)
- Differentiate the components of biodiversity. (DOK level 3)
- Investigate the economic and ecological benefits of biodiversity. (DOK level 3)
- Summarize the major causes of biodiversity loss (habitat loss/fragmentation, invasive species…) (DOK level 2)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Chapter 7 Central Case: Saving the Siberian Tiger - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 7 Common Assessment and Ecology Common Assessment – modified multiple (3 choices)

Unit 8: Natural Resources: Fisheries and Forestry, Agriculture and Food Production

Time/Days: 20 days

BY unit list:

Standards: 11.1.9.A.,3.2.10.B.7., 3.3.10.A.8., 4.3.12.A.,4.3.12.B., 4.3.12.C.,4.5.12.A., 4.4.12.B.,4.4.12.C.,4.4.12.D., CC.3.5.9-10.E, CC.3.6.11-12.C, 3.3.10.A8, 3.4.10.E2, 3.1.10.B4, 3.1.10.B6, 3.1.B.B1, 3.1.B.B4, 3.1.B.B6, 3.1.10.C2

Anchors: S11.D.1.3.,S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2.

Eligible Content: Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy). Describe how the process of DNA replication results in the transmission and/or conservation of genetic information. Explain how natural selection can impact allele frequencies of a population. Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration).

Objectives:

- Describe current management strategies for sustainable commercial fishing. (DOK 2)
- List some of the ecological and economical values of forest resources. (DOK 1)
- Estimate the economic and ecological values of Pennsylvania forests (DOK 2)
- Distinguish anatomy (layers) of a tree (DOK 2)
- Describe where most logging in PA and the U.S. takes place. (DOK 1)
- Summarize the role of fire in forest management. (DOK 2)
- Summarize the importance of the fire triangle to forest management (DOK 2)
- Discuss the potential effects of fire suppression on an ecosystem and on future fires. (DOK 2)
- Summarize the role of fire in secondary succession. (DOK 2)
- Assess the importance of fire to endangered and threatened species. (DOK 3)
- Distinguish the difference in the importance of fire in eastern and western ecosystems. (DOK 2)
- Explain the importance of prescribed fires in forest management. (DOK 2)
- List the components of soil (DOK 1)
- Describe the horizons that make up the soil profile. (DOK 2)
- Classify soil texture using the soil texture triangle. (DOK 2)
- Distinguish between weathering, erosion, and deposition (DOK 2)
- Describe some practices that can lead to soil erosion and some that can prevent it. (DOK 1)
- Discuss the beginnings of agriculture. (DOK level 2)
- Explain the importance of pollinators to agriculture. (DOK 3)
- Investigate the reasons for the decline of bumble bees and honeybees (DOK 3)
- Explain why the world needs to grow food and grow it sustainably. (DOK 2)
- Summarize the risks and benefits of GM food. (DOK 2)
- Summarize the differences between organic and conventional food. (DOK 2)
- Describe the advantages and disadvantages of industrial food production. (DOK 1)
- Discuss sustainable agriculture. (DOK 2)

Core Activities and Corresponding Instructional Methods:

- Chapter 11 Central Case: Transgenic Maize - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen
- Chapter 12 Central Case: Battling Over Clayoquot's Big Trees - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 8 Common Assessment – modified multiple choice (3 choices)

Unit 9: Natural Resource Management: Mining and Mineral Resources **Time/Days: 5 days**

BY unit list:

Standards: CC.3.5.9-10.E, CC.3.6.9-10.I, CC.3.6.11-12.C, 3.3.10.A1, 3.3.10.A2, 3.3.10.A3, 3.3.10.A4, 3.3.10.A8, 3.3.12.A2

Anchors: S11.D.1.3.,S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2., CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B7

Eligible Content:

Objectives:

- Explain what a mineral is. (DOK 1)
- Describe how minerals form. (DOK 2)
- Identify types of rocks and the stages of the rock cycle. (DOK 2)
- Identify the types of resources that are mined. (DOK 1)
- Summarize the different methods used for mining. (DOK 2)
- Explain how metals are processed. (DOK 2)
- Describe the negative impacts of mining on the environment and society (DOK 2)
- Explain how mining is regulated at the state and federal level (DOK 2)
- Assess how mineral use can become more sustainable. (DOK 3)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Chapter 13 Central Case: Mining for Cell Phones - - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 9 Common Assessment – modified multiple choice (3 choices)

Unit 10: Natural Resource Management: Water **Time/Days: 10 days**

BY unit list:

Standards: CC.3.5.9-10.E, CC.3.6.9-10.I, CC.3.6.11-12.C, 3.3.10.A1, 3.3.10.A3, 3.3.10.A4, 3.3.10.A5, 3.3.10.A6, 3.3.10.A8, 3.3.10.A5

Anchors: S11.D.1.3.,S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2., CC.3.5.9-10.E, CC.3.6.11-12.C, 3.2.C.B7

Eligible Content:

Objectives:

- Discuss how fresh water can be both renewable and limited. (DOK level 2)
- Explain the significance of a watershed. (DOK level 3)
- Relate the causes of surface water depletion to their effects. (DOK level 2)
- Explain the major causes and effects of groundwater depletion. (DOK level 3)
- Explain why groundwater pollution is difficult to clean up. (DOK level 3)
- Discuss the sources and effects of major pollutants found in the ocean. (DOK level 2)
- Describe how water is regulated and treated. (DOK level 1)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Chapter 2 Central Case: Cleaning the Tides of San Diego and Tijuana - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen
- Chapter 12 Central Case: Looking for Water in the Desert - Provide students with overview of article, teacher will provide questions for students to answer (answered in order found in article), discuss answers to questions with the class and provide written answers on screen

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 10 Common Assessment – modified multiple choice (3 choices)

Unit 11: Natural Resource Management: Renewable and Nonrenewable Energy

Time/Days: 10 days

BY unit list:

Standards: 11.1.9.A.,3.2.10.B.7., 3.3.10.A.8.,4.3.12.A., 4.3.12.B., 4.3.12.C., 4.5.12.A., 4.5.12.D, CC.3.5.9-10.E, CC.3.5.9-10.F, CC.3.6.9-10.I, 3.3.10.A2, 3.2.C.B3, 3.2.C.B2, 3.3.10.A1, 3.3.10.A4, 3.3.10.A5, 3.3.10.A8, 3.3.12.A2

Anchors: S11.D.1.3., S11.D.2.1., S11.A.3.2., S11.B.3.2., S11.B.3.3., S11.C.2.2., S11.A.1.3., S11.C.1.1., S11.A.1.1., S11.A.1.2.

Eligible Content:

Objectives:

- Describe the uses of coal and how it is removed from the ground. (DOK level 1)
- Describe the uses of oil. (DOK level 1)
- Explain the characteristics and uses of natural gas. (DOK level 3)
- Predict the future of fossil fuels. (DOK level 2)
- Explain how pollutants released by fossil fuels damage health and the environment. (DOK level 3)
- Explain the implications of dependence on foreign countries for fossil fuels. (DOK level 3)
- Explain why energy conservation is important. (DOK level 3)
- Describe how a nuclear power plant generates electricity. (DOK level 1)
- Identify the advantages and disadvantages of nuclear power. (DOK level 1)
- Define biomass energy and explain how it is used. (DOK level 1)
- Describe how geothermal energy is harnessed and used. (DOK level 1)
- Identify benefits and costs of hydropower. (DOK level 1)
- Describe how energy from the ocean can generate electricity. (DOK level 1)
- Describe techniques for using solar energy to heat buildings and generate electricity. (DOK level 1)
- Explain the benefits and costs of solar energy. (DOK level 2)
- Explain the benefits and costs of wind energy. (DOK level 2)
- Describe how hydrogen fuel can be produced. (DOK level 1)
- Identify the three categories of waste. (DOK level 1)
- Describe conventional waste disposal methods. (DOK level 1)
- Discuss the importance of reducing waste. (DOK level 2)
- Describe how composting and recycling help reduce the amount of waste. (DOK level 3)

Core Activities and Corresponding Instructional Methods: (groups arranged according to ability and needs)

- Environmental Issue Final Project – Students will be permitted to choose their partners (requires teacher's final approval of the pairs), Teacher will provide the instructions, discuss the project with the class, provide the grading rubric, and schedule the presentation dates for the project

Assessments:

- **Diagnostic:** Pre-Assessment to be given at the start of the unit, ATBs, Pair-Sharing (teacher provided questions during multiple class sessions to review and assess student learning)
- **Formative:** Modified ATBs, section quizzes, class activities, and assignments
- **Summative:** Unit 11 Common Assessment – modified multiple choice (3 choices)

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